

FINAL PROJECT

**COMPARISON OF STANDARD EXHAUST AND RACING
EXHAUST ON MACHINE PERFORMANCE**



Arranged by:

BONDAN SENOAJI PRAKOSA

D200102007

**MECHANICAL ENGINEERING DEPARTMENT
INTERNATIONAL PROGRAM
IN AUTOMOTIVE/MOTORCYCLE ENGINEERING
MUHAMMADIYAH UNIVERSITY OF SURAKARTA**

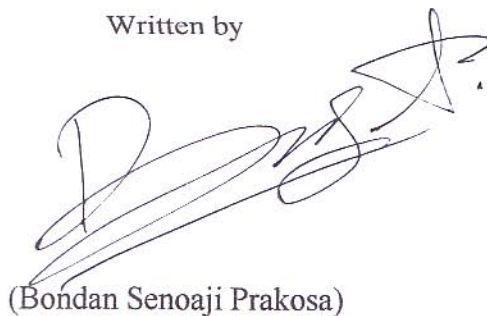
2017

DECLARATION

I certify that the thesis entitled "**Comparison of Standard Exhaust and Exhaust Racing on Machine Performance**" is made to fulfill as a requirement to obtain a bachelor's degree in Kingston International Automotive Engineering Department, Muhammadiyah University of Surakarta, as far as I know is not an imitation of research or duplication of a thesis that has been duplicated and or has been used to obtain a bachelor degree in the Muhammadiyah University of Surakarta, except for some of the sources of information that I have listed as appropriate.

Surakarta, September 2017

Written by

A handwritten signature in black ink, appearing to read 'Bondan Senoaji Prakosa', written over a horizontal line.

(Bondan Senoaji Prakosa)

APPROVAL

The final project entitles “**Comparison Of Standard Exhaust And Racing Exhaust On Machine Performance**”, has been approved by supervisor and authorized by Director of International Program as partial fulfillment of the requirements for getting the Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta.

Written by:

Name : **Bondan Senoaji Prakosa**

NIM : **D 200.10.2007**

Has Approved and legalized on:

Day : **Friday**

Date : **6 October 2017**

Supervisor,



(Ir. Subroto, MT.)

Admitted by,

Director of International Program



(Wijianto, ST, M. Eng. Sc.)

VALIDATION

The Final Project entitled “**Comparison Of Standard Exhaust And Racing Exhaust On Machine Performance**”, has been defended in front of examiners team and approved as a partial fulfillment of the requirements for getting the Bachelor degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta.

Written by:

Name : **Bondan Senoaji Prakosa**

NIM : **D 200.10.2007**

Has Approved and legalized on:

Day : *Friday*

Date : *6 October 2017*

Team of Examiners :

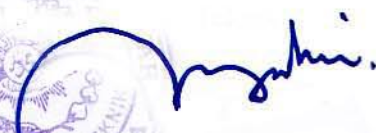
Chair Person : **Ir. Subroto, MT.**

Member 1 : **Wijianto, ST. M.Eng. Sc.**


Member 2 : **Ir. Tri Tjahjono, MT.**

(*[Signature]*)
(*[Signature]*)
(*[Signature]*)

Dean of
Engineering Faculty,


(**Ir. Sri Sunarjono, MT. PhD.**)

Head of
Mechanical Engineering Department,


(**Ir. Subroto, MT.**)

COMPARISON OF STANDARD EXHAUST AND RACING EXHAUST ON MACHINE PERFORMANCE

Bondan Senoaji Prakosa, Subroto

Automotive/Motorcycle Engineering Department

Muhammadiyah University of Surakarta

Jl. Ahmad Yani Tromol Pos I Pabelan Kartasura Surakarta 57102

ABSTRAK

Tujuan dari penelitian ini adalah untuk mengetahui kinerja tenaga dan torsi pada mesin untuk menguji knalpot standar dan balap knalpot balap. Pada pengujian ini menggunakan roda motor Honda Tiger 2000 raft 2005. Pengujian kinerja mesin dilakukan dengan menggunakan Dynojet 250i. Pengujian dilakukan secara bergantian untuk setiap knalpot agar mendapatkan perbandingan kinerja daya dan torsi maksimum.

Hasil penelitian menunjukkan bahwa penggunaan knalpot balap menghasilkan kinerja yang lebih baik, yaitu performa maksimum yang lebih lama dan kinerja torsi maksimum yang lebih besar, dibandingkan dengan penggunaan knalpot standar. Knalpot balap menghasilkan tenaga maksimum 17,08 hp dan torsi maksimum 11,35 kaki-lbs (15,38 Nm), sedangkan knalpot standar menghasilkan tenaga maksimum 17,00 hp dan torsi maksimum 11,35 kaki-lbs (15,38 Nm).

Kata kunci: standar, balap, knalpot, kinerja

ABSTRACT

The purpose of this study is to determine the performance of power and torque on the engine to test the standard exhaust and racing exhaust racing. In this test using Honda Tiger 2000 motorcycle object raft 2005. Testing engine performance is done by using Dynojet 250i. The test is performed alternately for each exhaust in order to obtain the maximum performance comparison of power and torque.

The results show that the use of racing exhaust produces better performance, that is longer maximum performance and greater maximum torque performance, compared to standard exhaust usage. The racing exhaust generates an maximum power of 17.08 hp and an maximum torque of 11.35 ft-lbs (15.38 Nm), while the standard exhaust generates an maximum power of 17.00 hp and an maximum torque of 11.35 ft-lbs (15.38 Nm).

Keywords: standard, racing, exhaust, performance performance

ACKNOWLEDGEMENT



Assalamu 'alaikum Wr. Wb.

Alhamdulillahillahirabbil' alamin. Praise be to Allah, The Great Rabb, the Most Gentle and Beneficiant, because of His blessing and guidance, the research paper can be finished.

The Final Project entitles “**Comparison Of Standard Exhaust And Racing Exhaust On Machine Performance**” can be finished because of helping and supporting from other people. Here, the writer most grateful to the following people for their comments and suggestions, especially to:

1. **Ir Sri Sunarjono, MT. Phd.** as the Dean of Engineering Faculty of Muhammadiyah University of Surakarta.
2. **Ir. Subroto, MT.,** as the Head of Mechanical Engineering Department of Muhammadiyah University of Surakarta.
3. **Wijianto, ST. M.Eng. Sc.,** as Director of International Program of Muhammadiyah University of Surakarta.
4. **Ir. Subroto, MT.,** as the first supervisor who has given many opportunities to the writer to develop the project.
5. **All lecturers** of Automotive Engineering Department for the guidance and share the knowledge during study in the class.
6. **My Beloved Mother (Ir.Sihwidiyati R.)** and **My Honorable Father (Suparno HP.)** who always prays support the writer. Hopefully, the writer will not let them disappointed.
7. All **his beloved friends** in Automotive Engineering thanks for nice friendship.

The writer realizes that this research paper is far from being perfect, so the writer sincerely welcomes any constructive comment, criticism, and suggestion.

Wassalamu 'alaikum Wr. Wb.

Surakarta, September 2017

The Writer

(Bondan Senoaji Prakosa)

MOTTO

+ “Verily, never will Allah change the condition of a people until they change it (their state of goodness)”

... (Q.S. Ar-Ra'du: 11)

+ “Nay, seek (Allah's) help with patient perseverance and prayer. It is indeed hard, except to those who bring a lowly spirit”

... (Q.S. Al-Baqarah: 45)

+ Try to not become a man of succes, but rather, try to become a man of value.

+ Wise man talks because they have something to say. Fool man talks because they have to say something.

+ If you cannot be a smart person, so be a good person.

TABLE OF CONTENTS

	Page
TITLE PAGE	i
DECLARATION	ii
APPROVAL	iii
VALIDATION	iv
ABSTRACT	v
ACKNOWLEDGMENT	vi
MOTTO	viii
TABLE OF CONTENTS	ix
LIST OF FIGURES	xi
LIST OF TABLES	xii
ATTACHMENT	xiii
 CHAPTER I: INTRODUCTION	 1
1.1. Background.....	1
1.2. Statement of the Problem	2
1.3. Objective of the Study	3
1.4. Benefit of the Study	3
1.5. Scope of the Study	3
 CHAPTER II: LITERATURE REVIEW	 4
2.1 Literature Study.....	4
2.2 Basic Theory.....	7
2.2.1 Definition of Exhaust	7
2.2.2 Exhaust Part	7
2.2.3 Exhaust Header Pipe.....	8
2.2.4 Length of Exhaust Pipe	8
2.2.5 Diameter of Exhaust Pipe	9
2.2.6 Resonator	10
2.2.7 Silencer	11
2.2.8 Exhaust Megaphone	11
 CHAPTER III: PROJECT METHODOLOGY	 15
3.1 Research Methodology	15
3.1.1 Literature Study	16
3.1.2 Preparation of Test Materials	16
3.1.3 Testing System	16
3.1.4 Standard Exhaust and Racing Exhaust Testing	16
3.1.5 Performance Data Collection.....	16
3.1.6 Data Analysis and Conclusion.....	16
3.1.7 Preparation of Report	17

3.2	Tools and Materials Used for Research	17
3.2.1	Materials	17
3.2.2	Research Tool	18
3.3	Research Step.....	19
CHAPTER IV: RESULT AND ANALYSIS		20
4.1	Dynojet Performance Evaluation	20
4.1.1	Standard Exhaust Test	20
4.1.2	Racing Exhaust Test	21
4.2	Analysis	22
CHAPTER V: CONCLUSION AND SUGGESTION.....		24
5.1	Conclusion	24
5.2	Suggestion.....	25
BIBLIOGRAPHY		26
ATTACHMENT		28
APPENDIX		

LIST OF FIGURES

		Page
Figure 2.1.	<i>Torque Curve for Intake and Exhaust Tuning.....</i>	6
Figure 2.2.	<i>Power Curve for Intake and Exhaust Tuning.....</i>	7
Figure 2.3	<i>Header Exhaust</i>	8
Figure 2.4	<i>Diameter Pipe.....</i>	9
Figure 2.5	<i>Resonator Exhaust</i>	10
Figure 2.6	<i>Silencer.....</i>	11
Figure 2.7	<i>Exhaust Diffuser/Megaphone</i>	12
Figure 2.8	<i>Horsepower for Exhaust Megaphone.....</i>	12
Figure 2.9	<i>Torque for Exhaust Megaphone</i>	13
Figure 2.10	<i>Megaphone Angle.....</i>	13
Figure 3.1	<i>Research Methodology</i>	15
Figure 3.2	<i>Exhaust Standard AHM.....</i>	17
Figure 3.3	<i>Exhaust Racing HRC.....</i>	18
Figure 3.4	<i>Dynojet 250i</i>	18
Figure 4.1	<i>Performance of Standard Exhaust</i>	20
Figure 4.2	<i>Performance of Racing Exhaust</i>	21
Figure 4.3	<i>Comparison Performance of Exhaust</i>	22

LIST OF TABLES

	Page
Table 1.1 <i>Intake and Exhaust Configuration</i>	6
Table 4.3 <i>Performance Evaluation of Exhaust</i>	22

ATTACHMENT

	Page
Figure 1. <i>Dynojet Photograph Test of Standard Exhaust</i>	28
Figure 2. <i>Dynojet Photograph Test of Racing Exhaust</i>	28